CHAPTER 2

The Mobile Device and Operating System Landscape

50 billion connected devices by 2020.

—Ericsson, 2010

Networked computers. Connected devices. Mobile devices. Machine-to-machine (M2M). On-the-Go (OTG). Portable computing. Smart services. The list goes on and on. The terminology used to describe machines that send data to other machines seems to change every day. With all of these different types of devices that are seemingly similar, it's easy to confuse them.

Android is certainly not the only operating system used on devices in today's markets. Various mobile operating systems have existed, and many are still in competition with Android. Although the focus of this book is on the Android market, an understanding of the competition—iOS, Windows Phone, and so on—is important for any successful business venture and is therefore the focus of this chapter. This is best put into words by the famous Chinese general and strategist Sun Tzu, in his *The Art of War:* "If you know the enemy and know yourself, you need not fear the results of a hundred battles."

Competition in the Mobile Space

The Android operating system is a very popular choice among consumers in the current commercial market. Over 250 million Android devices are in use today. But Android is not the only choice, nor was it the first mobile operating system implemented. There are several additional mobile operating systems, including iOS from Apple, MeeGo from Intel and Nokia, Windows Phone from Microsoft, and so on. There are many differences in the implementation of these operating systems and many diverse reasons that these platforms are used. This section provides a light overview of these other mobile operating systems, by discussing their strengths and weaknesses.

iOS

Developed and distributed by Apple, Inc., iOS was originally released in 2007 on the original iPhone and iPod Touch. Next to Android, iOS is currently the closest competitor in market share for the mobile OS space. As of May 2012, Android held 50.9 percent of subscribers as opposed to the iOS platform at 31.9 percent. It is important to note that iOS was originally called iPhone OS, based on its primary launch device, the iPhone.

Overview

Unlike Android, iOS has been a closed source since its inception and has been released on a limited number of platforms. Each new version of iOS includes new iOS devices developed and manufactured primarily by Apple. iOS is based loosely on OS X, Apple's desktop operating system, which in turn is partially based on the UNIX operating system. (OSX and Linux, and therefore iOS and Android, share a common developmental ancestor in BSD Unix, an open-source UNIX operating system variant developed and released by the University of California, Berkeley).

Applications

iOS comes with various system applications such as basic phone operations, a web browser (Safari), a media player, and an e-mail client. iOS is also capable of running a wide array of third-party applications created by developers using Apple's iOS Software Development Kit (SDK). Applications have access to all of the devices peripherals, which typically include various cameras, accelerometers to detect device movement, a microphone, onboard graphics chips for hardware acceleration, and a touch screen.

There are some significant differences in the supply of third-party applications for the Android OS. In order to develop applications for iOS devices, you are required to purchase a developer's license for the SDK. Applications for iOS devices are typically written in Objective-C and typically developed in Xcode, a development environment for OS X platforms. Furthermore, applications created using the SDK are screened and validated by Apple before being sold on iOS's market. This allows Apple to stop developers from releasing applications that could potentially hurt its user base, such as malware or information stealers.

There have been situations where Apple stopped valid applications from being released. In one case, a third-party application used the device's volume buttons as an alternative to pressing the onscreen button to take a photo with the camera. After realizing this, Apple removed the application from the App Store, claiming that this feature was a "violation of Apple's policies." The third-party company removed this feature, and Apple eventually released an update to its onboard camera that included this feature.

Platforms

Devices that run iOS are developed and sold through Apple, and for this reason there is very little variation. Although this may seem limiting, the lack of diversity of hardware enables applications to be standardized. For example, since there are only a few possible screen

sizes and graphics hardware, application developers only have to deal with a few different situations. iOS is featured on three main platforms—iPhone, iPad, and iPod Touch.

- **iPhone**—The iPhone is Apple's version of a smartphone, originally released in January of 2007. Each new version of the iPhone includes incremental updates to the iOS as well as new major features. The iPhone features a pocket-sized device, a multitouch screen, a camera in the back (and on the front in newer versions), and a microphone for audio.
- **iPad**—Released in April of 2010, the iPad is a tablet computer created and sold by Apple. It's about the size of a standard magazine. The iPad features a much larger screen than the iPhone, as well as some upgraded hardware. Each generation of the iPad has added significant hardware upgrades as well as new features. The iPad runs the same applications as the iPhone and the iPod Touch; however, applications can be created specifically for the iPad when desired.
- **iPod Touch**—Similar to the iPhone in almost every way, the first generation of iPod Touch hit consumers' fingers in September of 2007. The primary difference between the iPod Touch and the iPhone is the lack of cellular communications on the iPod Touch. Most applications created for the iPhone run on the iPod Touch with little to no code modifications on the developer's side. The iPod Touch offers an option to play with the iOS without having to pay the subscription fee of iPhone's cellular plan, or the added cost of the iPad.

BlackBerry

Sometimes referred to as the original smartphone, the BlackBerry was introduced in 2003. BlackBerry as of Q3 2013 held three percent of the mobile smartphone market share. The original BlackBerry featured a small color screen, a full QWERTY keyboard, a trackball, and a camera. Similar to Apple's practice, BlackBerry devices are developed and manufactured in-house by Research in Motion (RIM), which was renamed BlackBerry in early 2013. The original marketing goal of BlackBerry was to create devices for the average businessperson. This focus included the ability to check e-mails, access the Internet, and set up meetings easily and efficiently.

Windows Phone

Developed by Microsoft as the successor to Windows Mobile, Windows Phone is the fourth major competitor in the mobile operating system space. Windows Phones hit the consumer market in November of 2010, and unlike Windows Mobile, were aimed away from the enterprise markets. As of Q3 2013, Windows Phone and Windows Mobile held two percent of the mobile market share. Windows Phone has a much different layout than the traditional smartphone user interface. Microsoft has placed a lot of focus on ease of use, and connectivity with existing Windows services, such as Windows Live.

Symbian

Previously called Symbian OS, Symbian was developed by Accenture, one of the largest consulting and technology services firms in the world, for Nokia. As of May 2012, Symbian has dropped to 1.1 percent, from a massive 47 percent in February of 2009. Symbian features include various applications, multitouch screen, Wi-Fi, Bluetooth, and multitasking capabilities.

MeeGo

In February of 2010, Intel and Nokia at Mobile World Congress announced their latest adventure, MeeGo. MeeGo is a Linux-based, open source operating system targeted at a wide range of mobile devices. MeeGo was designed to run on lower performance devices such as netbooks, tablets, in-vehicle infotainment devices, smart TVs, and various other embedded systems. MeeGo featured a user interface very similar to Android with an assortment of applications. In September of 2011, the MeeGo project was canceled and the Intel team brought their experience and skills to Tizen, a new joint project between Intel and Samsung.

Before Android

It may seem like an eternity since Android-enabled devices have been out in the world and in our pockets. There was, however, extensive footwork and several predecessors that lead to the creation and innovation that is Android. Although there was nothing quite like Android prior to its existence, there are obvious inspirations for its common and sought-after features.

Smartphone History

In the days before Open Handset Alliance mobile devices, the software that ran on them was developed specifically for every new phone. Some of the decisions that were made for the Android OS trace back to the phones of the early 21st Century.

Simon Personal Communicator

Many credit IBM and BellSouth's Simon Personal Communicator (1994) with being the first smartphone. Simon combined many of the features of personal digital assistants (PDAs) with the features of existing cellular devices. In addition to being able to do cellular communication, Simon had a touch screen and various applications such as a calendar, games, a notepad, a calculator, and a touch-screen keyboard. Simon jump-started the smartphone market during a computer trade show in Las Vegas where the Simon prototype unit received notable interest. The Simon prototype was so popular it was featured on the front page of *USA Today*'s Money section the day after the trade show.

Nokia 9000 (Nokia Communicator)

Similar in many ways to Simon, the Nokia 9000 introduced in 1996 continued the vision and direction of the smartphone. The Nokia 9000 featured a twofold approach—it looked like a bulky phone when closed, and revealed a full QWERTY keyboard and a larger horizontal screen when opened. Like Simon, the Nokia 9000 featured various applications that allowed for functionality beyond a regular cellular device.

Kyocera 6035

Released five years later in 2001, the Kyocera 6035 looked much more like the modern-day smartphone. When closed, the Kyocera had physical buttons for use as a dial pad. When opened, it had a much larger vertical screen that contained various applications and tools. The Kyocera featured Palm OS, which enabled e-mail and web browsing.

BlackBerry 5810

The first BlackBerry phone released by Research In Motion (RIM) was the BlackBerry 5810 (2002). It featured a look that has stayed with BlackBerry to this day. Optimized for e-mail and business use, the BlackBerry 5810 was marketed toward business professionals. Features included a large touch screen, a full QWERTY keyboard, and an internal antenna.

The Mobile Market: Success and Failure

In any developing market, new ideas and innovations can generate significant interest or turn consumers off entirely. The mobile space is no exception. Although many mobile devices have sold very well, just as many have lost significant amounts of money. This section highlights some of the more recent successful and unsuccessful mobile devices to hit commercial markets.

Motorola i1

The Motorola i1, released in June of 2010, is an example of a less-than-successful mobile device. Although it was released on Boost Mobile with no contract necessary, the i1 only managed to run Android OS v1.5 (Cupcake) and could handle only 2G data speeds. In comparison to Motorola's other devices of 2010, namely the Droid X, the i1 sold poorly.

Droid X

Released in July of 2010, the Droid X is far from a failure. The Droid X features Android OS v2.1–2.3, a 4.3-inch multitouch screen, and 8GB of internal flash memory. With the imminent release of the iPhone 4, Motorola took an aggressive marketing campaign with the Droid X, announcing the device exactly one day before the iPhone 4 hit stores. It appears to have paid off, because the Droid X sold out online and in many retail locations.

BlackBerry Torch

The BlackBerry Torch, which featured BlackBerry OS 6, was described by Research In Motion's (RIM's) CEO Jim Balsillie as "a quantum leap over anything that's out there." However, the Torch sold a mere 150,000 units in the first three days of its launch. In comparison, the Apple iPhone 3G and 3GS both sold over a million units. The Torch is a prime example of a good product in a market of very good products. Although 150,000 units is a sizable number, it meant that the BlackBerry could not sustain its market share.

iPhone

One of the most successful devices of all time, selling millions of units on almost every release, Apple's iPhone device is a prime example of market success. Focusing on ease of use and presentation, the iPhone offers a different mobile experience. Apple's marketing focus for the iPhone can be described as simple, using Apple's logo as a means of capturing past iPod fans.

The Mobile Market: Trends

Although no guarantee can be made for the future, visible trends can help predict where the market will go next. The mobile space is no exception to these trends; in fact, in some cases they are even more easily recognizable. The connection between mobile devices and their users is an evolving situation that is creating a world of new possibilities. This "cyber fiber" allows users to be connected to the world around them at all times.

Location

Most modern devices have some sort of GPS or other method of locating where you are in the world. Many of the more popular applications have utilized this feature to encourage users to use their devices on the go. Whether you are checking the current temperature, tagging your location in a Facebook update, or trying to find your way back home, location services are being used more and more frequently.

With the release of iOS 5, Apple introduced location to its core operating system. For example, when you pass by a certain location, your mobile device can remind you that you need to pick up groceries. The appeal of this feature is obvious—instead of having to think of a specific time, you can now be reminded the next time you pass a drugstore that you need to pick up more aspirin. Building location features into applications is a current hot button for developers in all areas of smartphone development.

Current Mobile Uses

With Android, and all of the other operating systems, users have what feels like unlimited options for what to do with their mobile devices. But how are consumers using their devices, and how much time do they spend on them?

According to a Pew Internet & American Life study in May of 2013, 56 percent of all American adults are now smartphone users. The two most common uses of mobile phones are browsing the Web and searching for specific information, both of which account for a solid majority of all time spent on the device. Facebook and YouTube hold a very significant amount of this traffic, with Facebook having over 800 million mobile users as of 2013.

Of all smartphone owners, about 59 percent spend more than 30 minutes every day using web applications and utilities on their smartphones. However, the percentage of people actually communicating over phone calls and texting during a 30-minute period each day is much lower, at 32 percent. As our phones' applications have gotten richer, there has been a shift from old forms of communication like phone calls to newer social messaging formats such as Facebook, Twitter, and MySpace.

Commerce

Since mobile devices can do practically anything a laptop or home computer can do, it was only a matter of time until mobile devices were used directly for commerce. Whether it's buying new products from Amazon, purchasing applications from an App Store, or buying tickets for the game on Sunday, mobile devices have become a way to purchase goods and services on the go.

The mobile commerce market is in its infancy. Experts believe that the amount we spend from our phones will increase from just under a billion U.S. dollars to well over 99 billion by 2015.

Overview

The "cyber fiber" that is connecting modern society is very evident. Our mobile devices let us connect with the world at any time and in any place. The applications and operating systems that let us access this rich environment so easily act as the glue holding our world together. The next chapter discusses in detail how Android devices interact with existing technologies and what kinds of interfaces developers can use.